

<i>costvar</i> , c	
<i>termvar</i> , x, y, z, f	
<i>baseAttackVar</i> , b	
<i>index</i> , i, j, k	
A, B, C, E, F, D	$::=$ <ul style="list-style-type: none"> b $A \odot B$ $A \oplus B$ $A \triangleright B$ $A \multimap B$ $B \multimap A$ $A \multimap B$ (A) A
p	$::=$ <ul style="list-style-type: none"> x $p_1 \oplus p_2$ $p_1 \odot p_2$ $p_1 \triangleright p_2$ (p)
t, s	$::=$ <ul style="list-style-type: none"> x $t_1 \odot t_2$ $\text{let } p = t_1 \text{ in } t_2$ $t_1 \triangleright t_2$ $t_1 \oplus t_2$ $\lambda x. t$ $\lambda_l x. t$ $\lambda_r x. t$ $t_1 t_2$ $\text{app}_r t_1 t_2$ $\text{app}_l t_1 t_2$ (t)
Γ, Δ	$::=$ <ul style="list-style-type: none"> \cdot $x : A$ $\Gamma \mid \Gamma'$ Γ, Γ' $\Gamma; \Gamma'$ (Γ) Γ
Φ, Ψ	$::=$ <ul style="list-style-type: none"> \cdot $t : A$ Φ, Φ' (Φ) Φ

$$\boxed{\Gamma_1 \vdash \Gamma_2}$$

$$\begin{array}{c}
\overline{\Gamma \vdash \Gamma} \quad \text{C_ID} \\
\frac{\Gamma_1 \vdash \Gamma_2 \quad \Gamma_2 \vdash \Gamma_3}{\Gamma_1 \vdash \Gamma_3} \quad \text{C_C} \\
\overline{(\Gamma_1 \mid \Gamma_2) \mid \Gamma_3 \vdash \Gamma_1 \mid (\Gamma_2 \mid \Gamma_3)} \quad \text{C_A1} \\
\overline{\cdot \mid \Gamma_2 \vdash \Gamma_2} \quad \text{C_M1} \\
\overline{\Gamma_1 \mid \cdot \vdash \Gamma_1} \quad \text{C_M2} \\
\overline{\Gamma_1 \mid x_1 : A, x_2 : B \mid \Gamma_2 \vdash \Gamma_1 \mid x_2 : B, x_1 : A \mid \Gamma_2} \quad \text{C_E}
\end{array}$$

$$\boxed{\Phi_1 \vdash \Phi_2}$$

$$\begin{array}{c}
\overline{\Phi \vdash \Phi} \quad \text{CC_ID} \\
\frac{\Phi_1 \vdash \Phi_2 \quad \Phi_2 \vdash \Phi_3}{\Phi_1 \vdash \Phi_3} \quad \text{CC_C} \\
\overline{(\Phi_1, \Phi_2), \Phi_3 \vdash \Phi_1, (\Phi_2, \Phi_3)} \quad \text{CC_A1} \\
\overline{\cdot, \Phi_2 \vdash \Phi_2} \quad \text{CC_M1} \\
\overline{\Phi_1, \cdot \vdash \Phi_1} \quad \text{CC_M2} \\
\overline{\Phi_1, x_1 : A, x_2 : B, \Phi_2 \vdash \Phi_1, x_2 : B, x_1 : A, \Phi_2} \quad \text{CC_E}
\end{array}$$

$$\boxed{\Gamma \vdash t : A}$$

$$\begin{array}{c}
\overline{x : B \vdash x : B} \quad \text{T_VAR} \\
\frac{\Gamma_1 \vdash \Gamma_2 \quad \Gamma_2 \vdash t : A}{\Gamma_1 \vdash t : A} \quad \text{T_CTX} \\
\frac{\Gamma \vdash t_1 : A \quad \Delta \vdash t_2 : B}{\Gamma, \Delta \vdash t_1 \odot t_2 : A \odot B} \quad \text{T_PARAI} \\
\frac{\Gamma \vdash t_1 : A \quad \Delta \vdash t_2 : B}{\Gamma; \Delta \vdash t_1 \triangleright t_2 : A \triangleright B} \quad \text{T_SEQI} \\
\frac{\Gamma \vdash t_1 : A \odot B \quad \Delta_1 \mid x_1 : A, x_2 : B \mid \Delta_2 \vdash t_2 : C}{\Delta_1 \mid \Gamma \mid \Delta_2 \vdash \text{let}(x_1 \odot x_2) = t_1 \text{ in } t_2 : C} \quad \text{T_PARAE} \\
\frac{\Gamma \vdash t_1 : A \triangleright B \quad \Delta_1 \mid x_1 : A; x_2 : B \mid \Delta_2 \vdash t_2 : C}{\Delta_1 \mid \Gamma \mid \Delta_2 \vdash \text{let}(x_1 \triangleright x_2) = t_1 \text{ in } t_2 : C} \quad \text{T_SEQE} \\
\frac{\Gamma, x : A \vdash t : B}{\Gamma \vdash \lambda x. t : A \multimap B} \quad \text{T_LIMPI} \\
\frac{\Gamma \vdash t_1 : A \multimap B \quad \Delta \vdash t_2 : A}{\Gamma, \Delta \vdash t_1 t_2 : B} \quad \text{T_LIMPE}
\end{array}$$

$$\begin{array}{c}
\frac{\Gamma; x : A \vdash t : B}{\Gamma \vdash \lambda_r x. t : A \multimap B} \quad \text{T_RLIMPI} \\
\frac{\Gamma \vdash t_1 : A \multimap B \quad \Delta \vdash t_2 : A}{\Gamma; \Delta \vdash \text{app}_r t_1 t_2 : B} \quad \text{T_RLIMPE} \\
\frac{x : A; \Gamma \vdash t : B}{\Gamma \vdash \lambda_l x. t : B \multimap A} \quad \text{T_LLIMPI} \\
\frac{\Gamma \vdash t_1 : B \multimap A \quad \Delta \vdash t_2 : A}{\Delta; \Gamma \vdash \text{app}_l t_1 t_2 : B} \quad \text{T_LLIMPE}
\end{array}$$

$$\boxed{\Gamma \vdash \Phi}$$

$$\begin{array}{c}
\frac{}{x : B \vdash x : B} \quad \text{F_VAR} \\
\frac{\Gamma_1 \vdash \Gamma_2 \quad \Gamma_2 \vdash \Phi_2 \quad \Phi_2 \vdash \Phi_1}{\Gamma_1 \vdash \Phi_1} \quad \text{F_CTX} \\
\frac{\Gamma_2 \vdash \Phi_1, t : A, \Phi_3 \quad \Gamma_1 \mid x : A \mid \Gamma_3 \vdash \Phi_2}{\Gamma_1 \mid \Gamma_2 \mid \Gamma_3 \vdash \Phi_1, [t/x]\Phi_2, \Phi_3} \quad \text{F_CUT} \\
\frac{\Gamma_1 \mid x_1 : A, x_2 : B \mid \Gamma_2 \vdash \Phi}{\Gamma_1 \mid y : A \odot B \mid \Gamma_2 \vdash \text{let } (x_1 \odot x_2) = y \text{ in } \Phi} \quad \text{F_PARAL} \\
\frac{\Gamma \vdash t_1 : A, \Phi_1 \quad \Delta \vdash t_2 : B, \Phi_2}{\Gamma, \Delta \vdash t_1 \odot t_2 : A \odot B, \Phi_1, \Phi_2} \quad \text{F_PARAR} \\
\frac{\Gamma_1 \mid x_1 : A; x_2 : B \mid \Gamma_2 \vdash \Phi}{\Gamma_1 \mid y : A \triangleright B \mid \Gamma_2 \vdash \text{let } (x_1 \triangleright x_2) = y \text{ in } \Phi} \quad \text{F_SEQL} \\
\frac{\Gamma \vdash t_1 : A, \Phi_1 \quad \Delta \vdash t_2 : B, \Phi_2}{\Gamma; \Delta \vdash t_1 \triangleright t_2 : A \triangleright B, \Phi_1, \Phi_2} \quad \text{F_SEQR} \\
\frac{\Gamma_2 \vdash t_1 : A, \Phi_1 \quad \Gamma_1 \mid x : B \mid \Gamma_3 \vdash \Phi_2}{\Gamma_1 \mid y : A \multimap B, \Gamma_2 \mid \Gamma_3 \vdash \Phi_1, [y t_1/x]\Phi_2} \quad \text{F_LIMPL} \\
\frac{\Gamma, x : A \vdash t : B, \Phi \quad x \notin \text{FV}(\Phi)}{\Gamma \vdash \lambda x. t : A \multimap B, \Phi} \quad \text{F_LIMPR} \\
\frac{\Gamma_2 \vdash t_1 : A, \Phi_1 \quad \Gamma_1 \mid x : B \mid \Gamma_3 \vdash \Phi_2}{\Gamma_1 \mid \Gamma_2, y : A \multimap B \mid \Gamma_3 \vdash \Phi_1, [y t_1/x]\Phi_2} \quad \text{F_RLIMPL} \\
\frac{\Gamma; x : A \vdash t : B, \Phi \quad x \notin \text{FV}(\Phi)}{\Gamma \vdash \lambda_r x. t : A \multimap B, \Phi} \quad \text{F_RLIMPR} \\
\frac{\Gamma_2 \vdash t_1 : A, \Phi_1 \quad \Gamma_1 \mid x : B \mid \Gamma_3 \vdash \Phi_2}{\Gamma_1 \mid y : A \multimap B, \Gamma_2 \mid \Gamma_3 \vdash \Phi_1, [y t_1/x]\Phi_2} \quad \text{F_LLIMPL} \\
\frac{x : A; \Gamma \vdash t : B, \Phi \quad x \notin \text{FV}(\Phi)}{\Gamma \vdash \lambda_l x. t : B \multimap A, \Phi} \quad \text{F_LLIMPR} \\
\frac{\Gamma \vdash \Phi_1, t_1 : A, t_2 : B, \Phi_2}{\Gamma \vdash \Phi_1, t_1 \oplus t_2 : A \oplus B, \Phi_2} \quad \text{F_PARR} \\
\frac{\Gamma_1 \mid x_1 : A \vdash \Phi_1 \quad x_2 : B \mid \Gamma_2 \vdash \Phi_2}{\Gamma_1 \mid z : A \oplus B \mid \Gamma_2 \vdash (\text{let } x_1 \oplus x_2 = z \text{ in } \Phi_1), (\text{let } x_1 \oplus x_2 = z \text{ in } \Phi_2)} \quad \text{F_PARL}
\end{array}$$

Definition rules: 39 good 0 bad

Definition rule clauses: 66 good 0 bad